IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re: Patent Application of:
Yoneichi Ikeda, et al.
Conf. No.: 4274 Group Art Unit: 1764
Appln. No.: 10/087,238 Examiner: Tam M. Nguyen
Filing Date: March 1, 2002 Attorney Docket No.: 8305-217US(NP127-1)
Title: Process for Discharging and Transferring Fluidized Particles

## DECLARATION UNDER 37 C.F.R. § 1.132

I, Yuichiro Fujiyama, declare and state that:

1. I graduated from Tokyo Institute of Technology, the School of Engineering and was conferred a master's Degree from the Graduate School of Science and Engineering.
I was employed by Nippon Oil Co., Ltd. in 1990. Currently, I am employed by Nippon Oil Corporation, which is the assignee of the above-identified patent application in their Central Technical Research Laboratory, where I have been actively engaged in the research and development of refining processes, focusing on particularly the fluid catalytic cracking.

2. I am well acquainted with the field of a system using a circulating fluidizing layer and therefore conducted experiments described below on behalf of the assignee.

3. I have reviewed the final Office Action dated August 17, 2005, in the above-identified application, and a copy of U. S. Patent No. 3,409,542 (Molstedt) which the Examiner has relied on to reject all of the pending claims under 35 U. S. C. §102 (b) and §103 (a). This Declaration has been prepared to address the arguments made by the Examiner in support of the rejections of the claims.

4. It is my understanding that the Examiner is of the following position:
(1) Molstedt teaches an intermediate section has truncated cone ends to connect a dense fluidized layer forming section (reactor) and an upper section (riser), respectively, which is provided in an apparatus used for a process of discharging and transferring upwardly fluidized particles from the dense fluidized layer forming section to the upper section which has a

diameter that is smaller than that of the reactor;
(2) Molstedt does not specifically disclose the intermediate cylindrical section, but the cone of Molstedt is a special type of a cylindrical one and thus the limitation "cylindrical" is embraced by the reference;
(3) Claim 1 presently on file does not clearly define that a substantially cylindrical is a cylindrical which has an elevation angles of 85° or greater; and
(4) One of skill in the art would use an intermediated section with an elevation angle of 85° or greater because the gas velocity would be the same or similar when using either a short-pipe intermediated section with an elevation angel of about less than 85° or a longer-pipe intermediated section with a elevation angel of 85° or greater.

5. In order to overcome the Examiner's rejections, we amended Claim 1 presently on file by specifying that the intermediate cylindrical section has an elevation angle of 85° or greater, for defining that the intermediate cylindrical section is in a substantially cylindrical shape and differentiating the claimed invention over that of Molstedt, in which a truncated cone-shaped intermediate section is used.

6. Further, in order to demonstrate and prove that a process using an apparatus comprising the intermediated section of Molstedt fails to decrease pressure change sufficiently in comparison with the claimed process, I conducted additional experiments using two types of Two-Dimensional Fluidizing Layer Models, shown in a drawing accompanied herewith.

[Description of Two-Dimensional Fluidizing Layer Model]

The drawing shows plain views of the two models. Shown in the left-hand is a model corresponding to an apparatus as used in the claimed process wherein the intermediate section has a complete cylindrical shape, i.e., its elevation angle is 90°. Shown in the right hand is a comparative model corresponding to an apparatus as disclosed in Molstedt wherein the intermediate section has a truncated cone shape whose elevation angle is less than 85°, i.e., its elevation angle is 70°. These models are each constituted of a combination of a prism (rectangular column) section and a truncated pyramid section each having a 1.6 cm thickness except the riser portion (a cylinder having a 1.1 cm diameter).

Before providing the detail and results of the experiments, it is

necessary to explain the reason for using such two-dimensional models (though having a thickness in a certain extent).

If a prism and a cylinder have the same cross sectional area, the prism has a larger sidewall area than the cylinder. Therefore, the prism is more likely to cause more friction than the cylinder. As a result, in a model containing a prism section as an intermediate section, such friction brings about the uneven flows of fluidized particles and gas in the cross sectional direction and deteriorates relatively the fluidizing condition thereof, compared to a model containing a cylinder section. Therefore, the model containing a prism section has been scarcely applied to an industrial scale requiring a uniform fluidizing state. However, a Two-dimensional fluidizing layer model having a slight thickness and transparent walls is often advantageously used as an experimental apparatus because the fluidizing state of particles inside the fluidizing layer can be directly observed from the outside thereof through the transparent walls.

The additional experiments were conducted using each of the apparatuses fabricated by incorporating the above two models respectively thereinto, in place of the experimental apparatus illustrated in Fig. 1 in the specification under the following experimental conditions;

Fluidized catalyst: Normal FCC catalyst,
Average particle diameter: 60$\mu$m,
Bulk density: 0.827g/cm$^3$;
Fluidizing gas: Air (which was supplied at ordinary temperature and atmospheric pressure);
Fluidizing condition:
Filing height of the particles in the intermediate section:
Inventive Apparatus: 20 cm (Prism),
Molstedt's Apparatus: 9 cm (Pyramid); and
Superficial gas velocities at both intermediate sections:
Up = 20 cm/s.

Pressure loss and pressure change in the riser portion (which includes a riser portion and subsequent portions) were measured with a strain gauge mounted in the lower portion of the riser. The measured pressure change corresponds to change of the dense of the particles transferred through the each apparatuses.

As a result of the additional experiments, the following average

pressure changes in the riser portion ($\Delta P_R$) were obtained. In the both apparatuses an average transferred amount of the particles was 0.06 kg/s.

Average pressure change:

Inventive Apparatus: 181.5 Pa

Molstedt's Apparatus: 330 Pa

It was also observed that in the Molstedt's apparatus the clusters of the particles were transferred to the lower portion of the riser as they were, but in contrast that in the inventive apparatus the clusters of the particles almost broke up while rising through the prism-shaped intermediate section, so that the particles were uniformly dispersed in the fluidizing gas and then transferred to the lower portion of the riser.

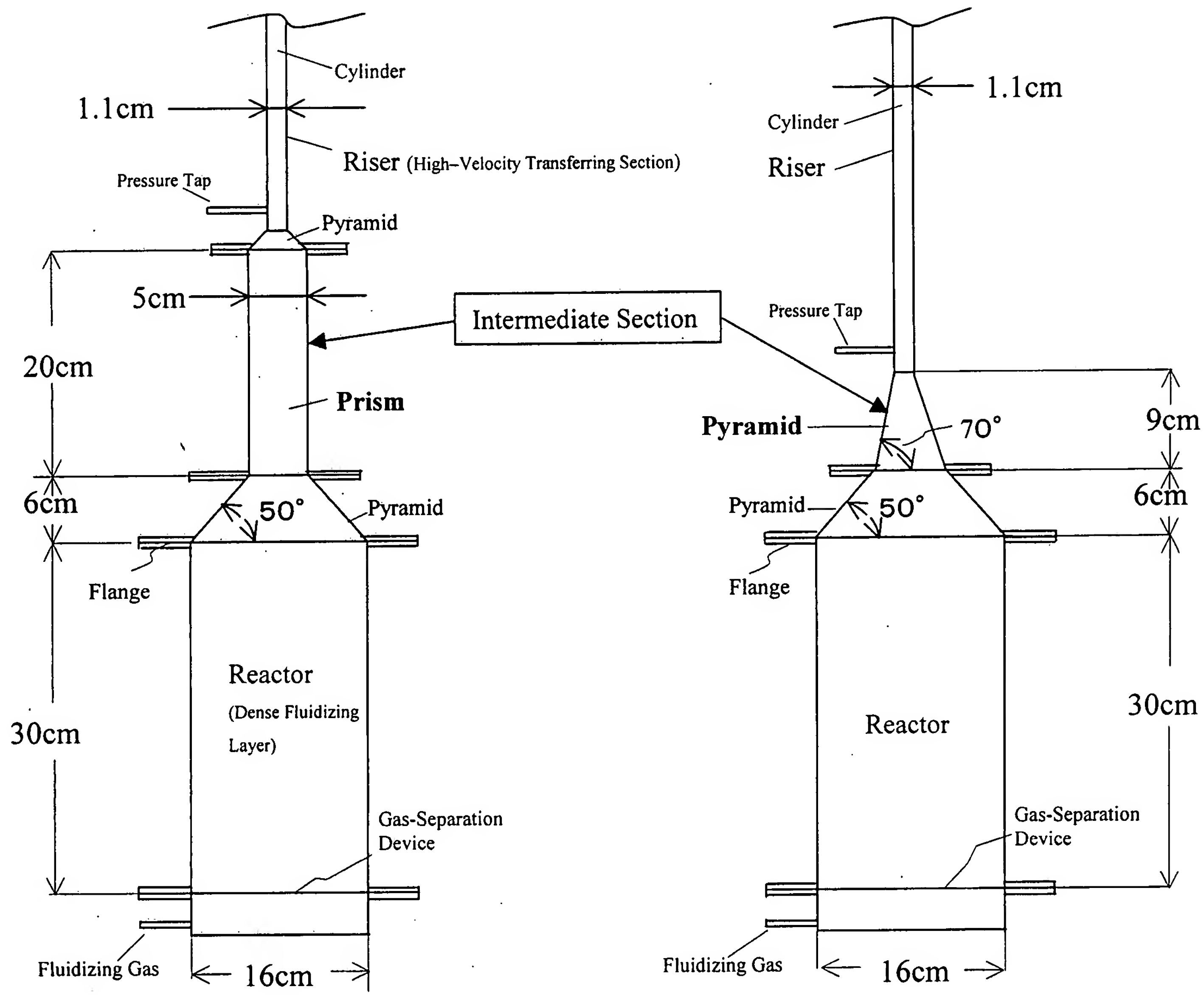
7. It is now apparent from the results of the additional experiments that the Molstedt's apparatus using the pyramid-shaped immediate cylindrical section fails to lead to the sufficient decrease of the pressure change in the riser portion.

8. I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 17 NOV. 2005 Yuichiro Fujiyama

Yuichiro Fujiyama

## Two-Dimensional Fluidizing Layer Model




Inventive Apparatus

Molstedt's Apparatus